

**Department of Agriculture, Trade and Consumer Protection
Division of Agricultural Development
Agricultural Development & Diversification Program (ADD)
Grant Project Final Report**

Contract Number: **20055**

Grant Project Title: **Expansion of Organic Tart Cherry and Apple Orchards: Development of Establishment and Management Protocols**

Amount of Funding Awarded: \$10,000.00

Name of Principal Contact Person: Stasiak, Matt

Address: 4312 Hwy 42, Sturgeon Bay, WI 54235

Telephone: 920 743-5406

Fax Number: 920 743-1080

E-Mail Address: mstasiak@wisc.edu

WEB Address:

Report Submitted on: February 23, 2007

Goals and Objectives

The growing market and price premium that is often seen for organic produce has increased tree fruit producers interest in organic production. The availability of unbiased research based data and information to help them convert conventional acreage or establish new organic plantings is limited. Our main objective was to establish an organic tree fruit test plot on the U/W Peninsular Research Station that would be used in future research and demonstration trials. This orchard would include one acre of tart cherry (100 trees) and one-half acre of apple (250-300 trees).

The short and long term goals of this project include assessing feasibility and profitability of organic tree fruit plantings. The limited two year time frame of the grant makes it impossible to address long term questions related to yield, crop quality and loss due to pest pressure. Apples and cherries typically do not begin to produce fruit until the third to sixth year after establishment. However, during the early establishment of these plantings basic question related to tree survivability, fertility management, orchard floor management, susceptibility to foliar disease and insect pressure could begin to be explored. Observations and data collected are being compared to conventional tree fruit plantings established with non-organic inputs.

Organic tree fruit outreach and research in Wisconsin can now be expanded as a research and demonstration site is now in place. The plantings established are the first and, so far, only organic apple and cherry research plantings in the state. They provide a site where U/W researchers can explore organic management trials addressing fertility, weed control, pest pressure and management. Past trials were established on commercial producer sites or treatments were imposed within conventionally managed research orchard plantings. Although

important insights and data were often obtained, trials and studies can now be done without the constraints often encountered in commercial plantings and with trees under complete organic management.

Project Description and Progress

2005. Site preparation was completed and initial plantings of 80 Montmorency/GI.6 cherry and 50 Honeycrisp/B.9 apple trees were made. A trickle irrigation system was installed.

- Synthetic and plant based mulching systems were established to compare and contrast effects on plant growth and quality.
- Fungal leaf pathogens on both apple and cherry were observed to be minimal, mainly due to the lack of infection events as a result of drought conditions. Organic fungicides were applied once to cherries (copper hydroxide) and twice on apples (copper hydroxide and *Bacillus subtilis*).
- Insect pressure was limited to leafroller (OBLR) and Gypsy Moth feeding in early June. Infestations were controlled with a single application of *Bacillus thuringensis* on both apple and cherry.
- A preliminary apple fungicide trial was completed with Dr. Patricia McManus of UW-Madison Plant Pathology and student intern Gina McNamer UW-Madison. The objective was to determine if an application of a copper hydroxide fungicide would have an impact on populations of *Bacillus sp.*
- Tree growth was observed to be acceptable for first year apple and cherry plantings. Nitrogen fertility management was recognized to be a concern especially for cherries which can have heavy requirement for this nutrient.
- Site preparation was completed for apple trees to be planted in spring 2006.

2006. Planted Scarlet O'Hare/G.16 (50 trees), Sansa/G.16 (50 trees) and Florina.G.16 (25 trees) in early May.

- Fungal leaf pathogens on both apple and cherry were observed and rated. Infection periods were more numerous than in the 2005 season. Cherry leafspot was present early, but was kept under control with 4 applications of Champion copper fungicide (copper hydroxide). Both apple and cherry were treated with Serenade for powdery mildew; apples 3 times and cherries twice. Some leaf apple scab was observed on the Honeycrisp trees but was not a major concern (<0.5% leaf infection).
- Insect pressure was limited to leafroller (OBLR) and Gypsy Moth feeding in mid-June. Infestations were controlled with a single application of Entrust on both apple and cherry. Potato leafhopper damage became quite heavy in mid summer on all apple varieties.
- Site preparation was completed for apple trees to be planted in spring 2007.
- Tree growth was observed to be acceptable for first and second year apple and cherry plantings. Nitrogen fertility management was recognized to be a concern especially for cherries which can have heavy requirement for this nutrient.
- Cherry leaf defoliation resulting from phytotoxic reaction to copper fungicide sprays was observed to be more severe than in convention cherry plantings. Possibly the lower fertility status of the organic trees may have contributed to this reaction

- Late fall the first half of a wildflower demonstration trail was established, the second half to be planted in spring of 2007. The species in the following table were planted as nectar and pollen sources to attractant and provide habitat for beneficial insects.

Scientific Name	Common name	Blooming period
<i>Asclepias tuberosa</i> L.	Butterfly weed	June-Aug
<i>Aster azureus</i>	Sky blue aster	Aug-Oct
<i>Coreopsis lanceolata</i> L.	Lanceleaf tickseed	June-Aug
<i>Echinacea purpurea</i> (L.) Moench	Purple coneflower	July-Aug
<i>Eryngium yuccafolium</i> Michaux	Rattlesnake-master	July-Sept
<i>Euphorbia corollata</i> L.	Flowering spurge	June-Aug
<i>Heliopsis helianthoides</i> (L.) Sweet	Oxeye sunflower	June-Aug
<i>Parthenium integrifolium</i>	Wild quinine	June-Sept
<i>Tradescantia ohioensis</i>	Smooth spiderwort	June-July
<i>Zizia aurea</i> (L.) Koch	Common golden alexanders	May-June

Results

Observation made during the establishment of this planting.

Orchard floor management and reduction of weed competition. Both the synthetic and plant based mulching systems that were established have provided very acceptable weed control. Tree growth that resulted was comparable to conventional, herbicide treated, trees. However, mulching requires greater expenditures for raw materials and a higher labor requirement for installation and maintenance compared to weed management done with conventional herbicides. This will continue to be a challenge as we maintain these orchards. Future management and trails will seek to address cost and labor requirement.

Nutrient management. Fertility has become a concern especially with the cherry trees, as they have a greater nitrogen requirement than apples being grown on dwarf rootstocks. This not only has an effect on tree growth, health and eventually productivity, but may be contributing to increased leaf drop associated with phytotoxicity from copper fungicide usage.

Disease incidence and control. The selection of scab resistant and low susceptibility apple varieties has so far resulted in very low occurrence of this disease. For diseases that strong resistance is not available, as is the case with cherry leafspot, and powdery mildew of both apple and cherry, organic fungal controls provide limited efficacy and offer a narrow range of choices which could present difficulties in dealing with resistance management in the future. Furthermore, phytotoxicity and negative fruit quality affects often associated with copper and sulfur based organic fungicides necessitate limited use. Environmental impacts are also a concern with these fungicidal compounds as they persist and at some point may accumulate to excessive levels.

Insect incidence and control. Foliage feeding insects remained or were kept below economically damaging levels with or without organic insecticide application. Single applications of either *Bacillus thuringensis* or Entrust have kept leaf feeding caterpillars under control. Mite and aphid populations have not yet been observed at levels that would warrant concern. However, minor pests like potato leaf hopper have shown potential to become more

damaging than in conventional plantings where broader spectrum and more efficacious insecticides may be suppressing their populations.

Plans for 2007 and Beyond. Additional trees will be planted in the spring of 2007. Variety and rootstock combinations are to include Scarlet O'Hare/G.16 (150 trees), Pixie Crunch/NIC29 (25 trees), Murray/ G.16 (25 trees) and Nova Spy/G.16 (25 trees). An additional 50 cherry trees (Balaton / CT500) will be added to the cherry orchard increasing the size of the planting to 1.5 acres. In trials with copper fungicides Balaton has exhibited a much less significant phytotoxic response than the Montmorency variety. These variety rootstock combinations have been or will be planted elsewhere on the station in conventionally managed blocks for comparison.

Following is a list of other plans and objectives:

- Weed management strategies, focusing on mulching treatments, will continue to be established and expanded on. Special attention will be focused on nutrient cycling, primarily nitrogen in the cherry planting. We are making plans to begin nutrient and disease trials with liquid fish fertilizer from the Damm Corporation.
- Expansion of pest scouting will include trapping for major, and some minor, apple and cherry insect pests. Included will be pheromone and other traps for OBLR, GFW, STLM, RBLR, CM, AM, and CFF. This will contribute to the pest complex database and begin to bring to light differences between conventional and organically managed systems.
- Insect management trial(s) with organically approved insecticides will be established as Honeycrisp and Montmorency cherry begin to produce fruit.

Conclusions

The intent of this project was to provide a site for future research and outreach projects and opportunities. We have met that goal and gained valuable experience in the establishment of this planting that we can begin to pass along to producers through our outreach efforts here at the U/W Peninsular Agricultural Research Station. Wisconsin tree fruit producers will need to decide if the added costs and changes in management associated with organic production can be adopted and made economically viable.

Funding will in large part determine the long term success of this project. Traditionally, federal and state funds along with support from producer groups like the WI Cherry Growers Inc. and the WI Apple Growers Association and the crop protection industry have been relied on to support tree fruit research in Wisconsin. In the future, only a limited portion of the monetary resources they provide can be expected to support what is essentially a new direction in tree fruit research. New funding sources will need to be found and exploited. Hopefully, environmental groups and other stakeholders will see the benefit that the research to be conducted will have in common with their goals and will offer support.